

Building Practice Note EE-02: Applying BCA energy efficiency measures to existing Class 2 to 9 buildings

This Practice Note provides guidance on the application of the BCA Section J energy efficiency measures for alterations to existing Class 2 to 9 buildings, excluding Class 2 SOUs and Class 4 parts of a building.

The content below provides guidance on:

- Requirements for Class 2 to 9 buildings
- Partial compliance
- Energy Efficiency: Deemed-to-Satisfy provisions
- Air-conditioning and ventilation systems
- Artificial light and power
- Access for maintenance

Abbreviations & Definitions

The abbreviations and definitions set out below are for guidance only. They are not intended to vary those set out in the Building Act 1993 (Act), the Building Regulations 2018 (Regulations) or the National Construction Code 2019 (NCC).

- **ABCB** – Australian Building Codes Board
- **Act** – Building Act 1993
- **BCA** – Building Code of Australia Volume One
- **DtS** – Deemed-to-Satisfy
- **NCC** – National Construction Code 2019
- **RBS** – Relevant Building Surveyor
- **Regulations** – Building Regulations 2018
- **SOU** – Sole-Occupancy Unit

Requirements for Class 2 to 9 buildings

Section J of the BCA contains energy efficiency requirements for Class 2 to 9 buildings, which apply to new building work and alterations to existing buildings.

Alterations and extensions to Class 2 to 9 buildings must comply with the Regulations and the relevant provisions of the NCC. The Regulations may modify the NCC, and regulation 233 has specific provisions in relation to alterations and extensions.

Subject to the extent of the work (refer Table 1 and Table 2), there are generally two options to consider for compliance:

- compliance with the provisions of the NCC, and
- partial compliance as permitted by the Regulations.

Compliance with the NCC means satisfying Performance Requirements JP1 for the alteration or extension, and for the existing building, where triggered. The RBS may consent to partial compliance in certain circumstances, where it may not be reasonable to satisfy Performance Requirement JP1 but where acceptable compliance outcome can be achieved.

Partial compliance

Regulation 233 requires that all new building work, including work to alter an existing building, must comply with the Regulations.

There is a threshold measure which determines if the remainder of an existing building needs to be improved to comply with the Regulations (refer Table 1 and Table 2). If the proposed alterations, together with any other alterations completed or permitted within the previous 3 years, represent more than half the original volume of the building, the remainder of the existing building must be improved.

This regulation also provides that the RBS has discretionary power to consent to partial compliance with the Regulations. The RBS may only consent to partial compliance in respect of the extension, if the floor area of the extension is not greater than the lesser of:

- 25% of the floor area of the existing building; or
- 1000m².

When applying regulation 233, the RBS must also consider other requirements relative to Class 2 to 9 buildings, including:


- section 28 of the Act – Historic buildings and special buildings
- regulation 229 – Change of use
- regulation 231 – Subdivision of existing building
- regulation 234 – Alterations affecting exits and paths to exits.

Volume alteration	Application & Limitations	Consent to partial compliance
Less than 50% of existing building, including work done in the past 3 years	<ul style="list-style-type: none"> • New building work only must comply with the Regulations - reg 233(1) & (2) 	Available
50% of existing building or greater, including work done in the past 3 years	<ul style="list-style-type: none"> • New building work and existing building must comply with the Regulations - reg 233(1) & (2) • Existing building may be considered in partial compliance determination - reg 233(3) • Limitations on partial compliance remain present for new additions - see Table 2 	Available

Table 1: Application of Regulations and availability of partial compliance for alterations to existing buildings

Floor area addition	Application & Limitations	Consent to partial compliance
Less than 25% of existing building	<ul style="list-style-type: none"> • New building work only must comply with the Regulations - reg 233(6) • New building work and existing building may be considered in partial compliance determination 	Available
Extension greater than 25% of the existing building (or the lesser of 25% or 1000m ²)	<ul style="list-style-type: none"> • New building work only must comply with the Regulations - reg 233(3) & (6) • Applies to the extension component of building work only • Existing parts of the building may still be subject to partial compliance determination - see Table 1 	Not available

Table 2: Application of Regulations and availability of partial compliance for additions to existing buildings



For further information regarding the use of discretionary power by the RBS refer to [Practice Note BP-12: Exemptions from Compliance with Regulations](#).

What is reasonable?

Regulation 233 sets out matters the RBS must consider before deciding if full compliance would be reasonable. This includes but is not limited to considering:

- the objectives under section 4 of the Act, in particular -
 - safety and health
 - amenity
 - cost effective construction and maintenance
 - facilitate environmentally and energy efficient,
- the energy efficiency objectives and functional statements of the NCC,
- the overall energy efficiency performance, including whether improved outcomes are achieved for the existing building.

The RBS should apply their professional judgment to the specific matter being assessed. In some instances, the RBS will need to seek the advice of other suitably qualified practitioners or industry experts in determining the acceptability or otherwise of partial compliance.

The energy efficiency provisions have been developed on a basis of efficient use of energy and long-term cost effectiveness for the building owner or occupier. Therefore, it would be reasonable to consider those factors when determining whether to consent to partial compliance with the energy efficiency provisions.

Energy Efficiency: Deemed-to-Satisfy provisions

The ABCB has produced several handbooks that provide guidance about energy efficiency requirements for Class 2 to 9 Buildings and applying Section J. These are available from the ABCB website at www.abcb.gov.au.

Building fabric

Where the new work includes replacement of existing elements, such as roof cladding, wall cladding or wall lining, compliance with the BCA fabric provisions should be achieved. However, if these items only require minor repair work, then it may be unreasonable to require their removal, solely to install new insulation.

Partial compliance may be considered for the extension under regulation 233, subject to the restriction under regulation 233(6). The discretion to allow partial compliance applies to both the building work associated with the alteration and the requirement to bring the remainder of the building into compliance. In granting partial compliance, the RBS should require the level of compliance to be as close to full compliance as is reasonable.

Example 1: Building Fabric - Partial Compliance

An existing office building between a main street and a lane is being extended to the adjoining allotment and, for aesthetic reasons, the existing facade is being replaced. The fabric of the extension must comply with the BCA fabric provisions. As the facade is being replaced, it is reasonable to expect for insulation to be added to the external wall of the existing building. However, as work is not being carried out on the rear wall of the existing building (other than painting), it may not be reasonable to require the rear wall to be insulated.

External walls and glazing

The glazing and external walls in building extensions must comply with the BCA. This requirement also applies to existing external walls and glazing if all the existing wall-glazing construction in a building is replaced.

The BCA relies on two key indicators for the performance of windows:

- **The U-value**, which is an expression of the window's thermal performance and is the inverse of the R-value of the insulation. Therefore, the higher the U value the poorer the performance of the window.
- **The solar admittance or Solar Heat Gain Coefficient (SHGC)**, which is the fraction of incident irradiance on glazing that adds heat to a building's space. Therefore, the higher the SHGC, the more light enters the building and contributes to greater heat gain.

DtS calculation methods for the total system U-Value and solar admittance of wall-glazing construction are set out in Specification J1.5a.

Both U-Value and solar admittance are required to be calculated for the walls and glazing facing each aspect (northern, southern, eastern and western) separately (Method 1), or facing multiple aspects (Method 2).

When using **Method 1** each aspect is required to meet the applicable total system U-Value and solar admittance.

When using **Method 2**, multiple aspects are assessed together, allowing trading of thermal performance values between different aspects.

Both Method 1 and 2 require existing wall-glazing construction to be considered.

In some cases, it may be unreasonable for new wall-glazing construction in an extension to compensate for the poor performance of the existing wall-glazing construction. In such instances it may be reasonable to determine compliance by applying the performance of the new wall-glazing construction uniformly to a single façade for Method 1, or to the whole storey for Method 2, but only require the complying glazing to be installed in the extension.

Shading

Shading to a building and the windows has a significant impact on the building's energy efficiency performance.

Changes to shading may affect the energy efficiency rating of an existing building. They may also have a negative impact on the performance of the building's mechanical services and their ability to maintain comfortable temperatures within the building.

Site constraints or planning requirements may reduce options to provide external shading to an existing building. In such circumstances the required performance level may be achieved by installing more energy efficient windows instead of external shading devices.

Partial compliance is an option the RBS may consider. However, in making a decision, the RBS needs to have regard for:

- the occupant comfort,
- the cost of maintaining comfortable temperatures in the building,
- risks of overheating, and
- the cost of upgrading the windows borne by the owner.

Consent to partial compliance is not an option where full compliance is required under Regulation 233 (6).

Building sealing

An extension to an existing building should be sealed in accordance with the BCA sealing provisions. If an existing room is being extended, the need for sealing may depend upon its condition. If the existing part is not sealed, for example having large areas of unsealed louvred glazing, there may be little benefit in sealing the new part.

Where a new extension is proposed to an existing unsealed building, a practical approach may be to accommodate different levels of sealing in the new and existing parts of the building and by installing sealed doors between the two parts. The final decision should be based on the relative size of the extension, the extent to which the existing part is unsealed and to which sealing of the new part is practical and beneficial.

Air-conditioning and ventilation systems

Where a new extension is proposed to an existing building, the extension may include installation of air-conditioning and ventilating systems. This could mean either new air-conditioning throughout the existing building and the new extension. Alternatively, it could consist of a combination of a new system and the existing system, which was already installed in the existing part of the building.

The BCA provisions may also apply where the air-conditioning system in an existing building is being replaced with a new and upgraded system.

New systems and elements in new parts of a building, and new elements and systems in existing parts of a building, should all comply with the BCA services provisions.

Some BCA air-conditioning provisions relate to the system, while others relate to equipment. System-related aspects include outside air cycles, controls, zoning, time switches and fan motor power, which may affect the operation of the new part of the system. If they only affect existing elements and are not part of the new building work, they need not be upgraded to comply with the current BCA provisions. New items such as a boiler, chiller, package air-conditioner, piping insulation (for new piping) and the like, would be required to comply with the BCA.

New piping and ductwork, whether within a new or existing part of a building, should comply with the BCA provisions. It would be unreasonable to expect that the existing ductwork concealed behind ceilings and risers should be upgraded.

If ductwork and piping is replaced as part of a refurbishment, it would be reasonable to expect that the new ductwork and piping, including terminal flexible ductwork, will comply with the BCA provisions.

Example 02: Air-conditioning, Partial Compliance

The air distribution elements of an existing air-conditioning system are being modified as part of a general refurbishment. The work includes repositioning some existing uninsulated ductwork and replacing some of the ductwork altogether. Ideally, all ductwork in the area being refurbished should be insulated to the current BCA requirements. However, an assessment made on the cost effectiveness of installing new insulated ductwork, including the cost of lowering ceilings and obtaining access to tight locations, may demonstrate that full compliance is not reasonable.

A typical example would be when new rooms are added to an existing building, or when an existing building is being refurbished. The new or refurbished space may be served by a totally new air-conditioning system, or by extending the existing system. If a new air-conditioning system is installed, then it will need to comply in all respects with the BCA provisions. If an existing system is extended, then only the new components need to comply.

Example 03: Air-conditioning, Partial Compliance

Another floor is being added to an existing building. The work includes extending the existing air-conditioning and increasing its capacity to serve the extension. The new floor will have ductwork that complies with the current BCA provisions, but the central air-conditioning unit in the basement is simply being modified to provide more capacity. The main ductwork runs are not being replaced, because of limited riser space. It may be unreasonable in this case to require the main ductwork to comply with the current BCA provisions for insulation, because of the limited space and access.

Artificial light and power

Lighting is very similar to air-conditioning and ventilating systems, in that new elements and new systems in new parts of a building need to comply with the BCA provisions, as should new elements and new systems in existing parts.

Artificial lighting requirements for Class 2 SOUs and Class 4 parts of a buildings are provided in BCA Volume One Part J6.2. Most lighting components are in, or adjacent to, the space being served, which means that they are generally easily accessible and therefore more easily upgraded.

Where work is undertaken in a section of the building, only the artificial lighting in that area needs to be considered when assessing the artificial lighting against the BCA requirements.

Example 04: Artificial Lighting

A shop is being refurbished for a new tenant. It is proposed that some lights are replaced, and others are relocated. The existing wiring is being reused. The BCA lighting provisions are based on an aggregate design illumination power load for the whole shop, so that aggregate cannot be exceeded by the existing and new lighting combined. Even if no new lights are to be installed and all the existing lights are being reused, compliance should still be achieved.

Access for maintenance

Access should be provided for maintenance of new building services. The ideal level of access to new building services located in existing parts of a building may be difficult to provide. Provision of a reasonable level of access in such cases should be guided by cost effectiveness.

Example 05: Plant Room Maintenance Access

A building is being extended, but the air-conditioning plant for the extension will be located in the rooftop plantroom of the existing building. Restrictions on the height of the extension prevent a rooftop plant room from being located on top of the extension. As the new air-conditioning plant is being placed in the existing plantroom, only limited access is available for maintenance purposes. It may be considered unreasonable to require that additional access and egress is provided within the existing plantroom, subject to reasonable provision for safety and health of people using the plantroom.

Related Documents

- Building Act 1993
- Building Regulations 2018
- Building Code of Australia 2019 Volume One
- Building Practice Note BP-12: Exemptions from compliance with regulations
- Building Practice Note EE-03: New Residential Buildings
- Building Practice Note EE-04: Alterations to existing Class 1 buildings

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